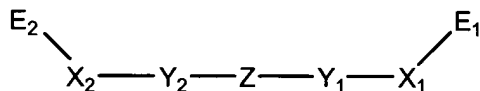


# CLAIMS

What is claimed is:

1. An organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising:

(a) a charge transport material having the formula



where  $Y_1$  and  $Y_2$  comprise, each independently, a carbazolyl group;

$X_1$  and  $X_2$ , each independently, have the formula  $-(CH_2)_m-$ , branched or linear, where  $m$  is an integer between 0 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, P, C=O, O=S=O, a heterocyclic group, an aromatic group, urethane, urea, an ester group, an amide group, an  $NR_3$  group, a  $CR_4$ , or a  $CR_5R_6$  group where  $R_3$ ,  $R_4$ ,  $R_5$ , and  $R_6$  are, independently, a bond, H, hydroxyl, thiol, carboxyl, an amino group, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring;

$E_1$  and  $E_2$  comprise, each independently, an epoxy group; and

$Z$  is a linking group comprising a bond, a  $-(CR_5=CR_6)_n-$  group, a  $-CR_7=N-$  group, or an aromatic group, where  $R_5$ ,  $R_6$ , and  $R_7$  are, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, or an aromatic group, and  $n$  is an integer between 1 and 10, inclusive; and

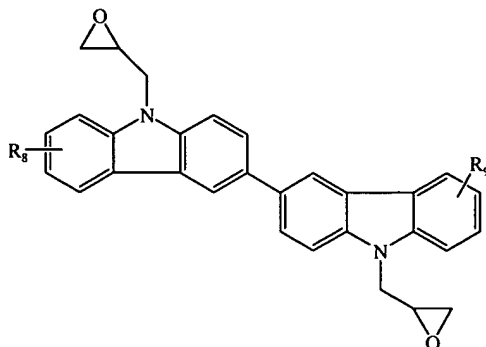
(b) a charge generating compound.

2. An organophotoreceptor according to claim 1 wherein  $Z$  is a bond.

3. An organophotoreceptor according to claim 1 wherein  $X_1$  and  $X_2$  are, each independently, a methylene group.

4. An organophotoreceptor according to claim 1 wherein  $E_1$  and  $E_2$  are, each independently, an oxiranyl ring.

5. An organophotoreceptor according to claim 1 wherein the charge transport material is selected from the group consisting of the following formula:



where  $R_8$  and  $R_9$  are, each independently, H, hydroxyl, thiol, carboxyl, -CHO, a keto group, an amino group, cyano, nitro, a halogen, an alkoxyl group, an alkyl group, an alkenyl group, an epoxy group, a thiiranyl group, an aziridino group, a heterocyclic group, or an aromatic group.

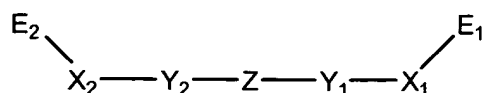
6. An organophotoreceptor according to claim 1 wherein the photoconductive element further comprises a second charge transport material.

7. An organophotoreceptor according to claim 6 wherein the second charge transport material comprises an electron transport compound.

8. An organophotoreceptor according to claim 1 wherein the photoconductive element further comprises a binder.

9. An electrophotographic imaging apparatus comprising:  
 (a) a light imaging component; and  
 (b) an organophotoreceptor oriented to receive light from the light imaging component, the organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising:

(i) a charge transport material having the formula



where  $Y_1$  and  $Y_2$  comprise, each independently, a carbazolyl group;

$X_1$  and  $X_2$ , each independently, have the formula  $-(CH_2)_m-$ , branched or linear, where  $m$  is an integer between 0 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, P, C=O, O=S=O, a heterocyclic group, an aromatic group, urethane, urea, an ester group, an amide group, an  $NR_3$  group, a  $CR_4$ , or a  $CR_5R_6$  group where  $R_3$ ,  $R_4$ ,  $R_5$ , and  $R_6$  are, independently, a bond, H, hydroxyl, thiol, carboxyl, an amino group, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring;

$E_1$  and  $E_2$  comprise, each independently, an epoxy group; and

$Z$  is a linking group comprising a bond, a  $-(CR_5=CR_6-)_n-$  group, a  $-CR_7=N-$  group, or an aromatic group, where  $R_5$ ,  $R_6$ , and  $R_7$  are, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, or an aromatic group, and  $n$  is an integer between 1 and 10, inclusive; and

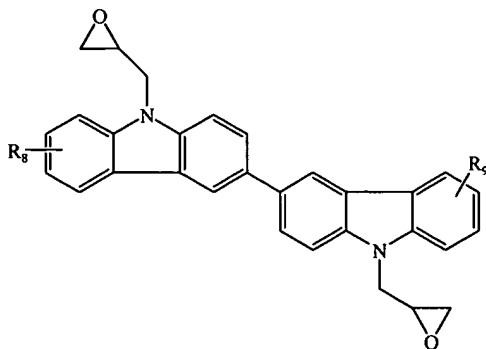
(ii) a charge generating compound.

10. An electrophotographic imaging apparatus according to claim 9 wherein  $Z$  is a bond.

11. An electrophotographic imaging apparatus according to claim 9 wherein  $X_1$  and  $X_2$  are, each independently, a methylene group.

12. An electrophotographic imaging apparatus according to claim 9 wherein  $E_1$  and  $E_2$  are, each independently, an oxiranyl ring.

13. An electrophotographic imaging apparatus according to claim 9 wherein the charge transport material is selected from the group consisting of the following formula:



where  $R_8$  and  $R_9$  are, each independently, H, hydroxyl, thiol, carboxyl, -CHO, a keto group, an amino group, cyano, nitro, a halogen, an alkoxyl group, an alkyl group, an alkenyl group, an epoxy group, a thiiranyl group, an aziridino group, a heterocyclic group, or an aromatic group.

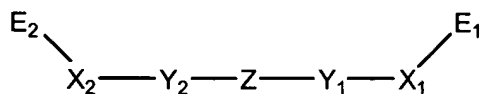
14. An electrophotographic imaging apparatus according to claim 9 wherein the photoconductive element further comprises a second charge transport material.

15. An electrophotographic imaging apparatus according to claim 14 wherein second charge transport material comprises an electron transport compound.

16. An electrophotographic imaging apparatus according to claim 9 further comprising a liquid toner dispenser.

17. An electrophotographic imaging process comprising;  
(a) applying an electrical charge to a surface of an organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising

(i) a charge transport material having the formula



where  $Y_1$  and  $Y_2$  comprise, each independently, a carbazolyl group;

$X_1$  and  $X_2$ , each independently, have the formula  $-(CH_2)_m-$ , branched or linear, where  $m$  is an integer between 0 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, P, C=O, O=S=O, a heterocyclic group, an

aromatic group, urethane, urea, an ester group, an amide group, an  $\text{NR}_3$  group, a  $\text{CR}_4$ , or a  $\text{CR}_5\text{R}_6$  group where  $\text{R}_3$ ,  $\text{R}_4$ ,  $\text{R}_5$ , and  $\text{R}_6$  are, independently, a bond, H, hydroxyl, thiol, carboxyl, an amino group, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring;

$\text{E}_1$  and  $\text{E}_2$  comprise, each independently, an epoxy group; and

$\text{Z}$  is a linking group comprising a bond, a  $-(\text{CR}_5=\text{CR}_6-)_n-$  group, a  $-\text{CR}_7=\text{N}-$  group, or an aromatic group, where  $\text{R}_5$ ,  $\text{R}_6$ , and  $\text{R}_7$  are, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, or an aromatic group, and  $n$  is an integer between 1 and 10, inclusive; and

(ii) a charge generating compound.

(b) imagewise exposing the surface of the organophotoreceptor to radiation to dissipate charge in selected areas and thereby form a pattern of charged and uncharged areas on the surface;

(c) contacting the surface with a toner to create a toned image; and

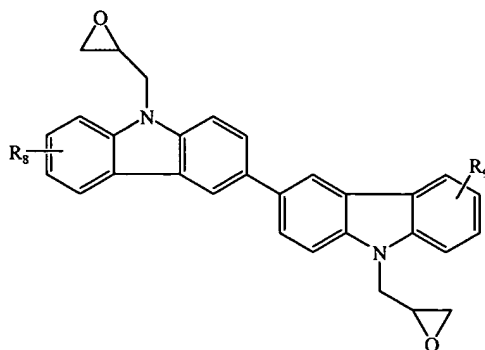
(d) transferring the toned image to substrate.

18. An electrophotographic imaging process according to claim 17 wherein  $\text{Z}$  is a bond.

19. An electrophotographic imaging process according to claim 17 wherein  $\text{X}_1$  and  $\text{X}_2$  are, each independently, a methylene group.

20. An electrophotographic imaging process according to claim 17 wherein  $\text{E}_1$  and  $\text{E}_2$  are, each independently, an oxiranyl ring.

21. An electrophotographic imaging process according to claim 17 wherein the charge transport material is selected from the group consisting of the following formula:



where  $R_8$  and  $R_9$  are, each independently, H, hydroxyl, thiol, carboxyl, -CHO, a keto group, an amino group, cyano, nitro, a halogen, an alkoxyl group, an alkyl group, an alkenyl group, an epoxy group, a thiiranyl group, an aziridino group, a heterocyclic group, or an aromatic group.

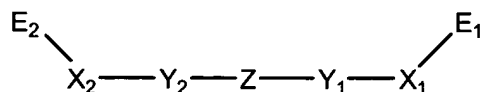
22. An electrophotographic imaging process according to claim 17 wherein the photoconductive element further comprises a second charge transport material.

23. An electrophotographic imaging process according to claim 22 wherein the second charge transport material comprises an electron transport compound.

24. An electrophotographic imaging process according to claim 17 wherein the photoconductive element further comprises a binder.

25. An electrophotographic imaging process according to claim 17 wherein the toner comprises a liquid toner comprising a dispersion of colorant particles in an organic liquid.

26. A charge transport material having the formula



where  $Y_1$  and  $Y_2$  comprise, each independently, a carbazolyl group;

$X_1$  and  $X_2$ , each independently, have the formula  $-(CH_2)_m-$ , branched or linear, where  $m$  is an integer between 0 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, P, C=O, O=S=O, a heterocyclic group, an

aromatic group, urethane, urea, an ester group, an amide group, an  $\text{NR}_3$  group, a  $\text{CR}_4$ , or a  $\text{CR}_5\text{R}_6$  group where  $\text{R}_3$ ,  $\text{R}_4$ ,  $\text{R}_5$ , and  $\text{R}_6$  are, independently, a bond, H, hydroxyl, thiol, carboxyl, an amino group, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring;

$\text{E}_1$  and  $\text{E}_2$  comprise, each independently, an epoxy group; and

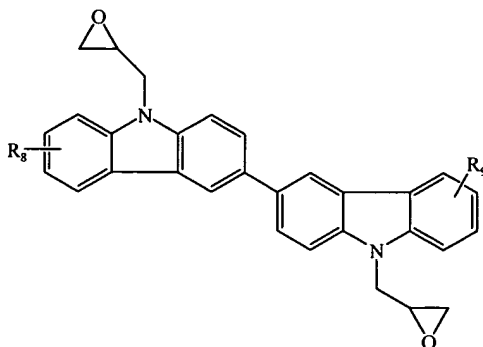
$\text{Z}$  is a linking group comprising a bond, a  $-(\text{CR}_5=\text{CR}_6-)_n-$  group, a  $-\text{CR}_7=\text{N}-$  group, or an aromatic group, where  $\text{R}_5$ ,  $\text{R}_6$ , and  $\text{R}_7$  are, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, or an aromatic group, and  $n$  is an integer between 1 and 10, inclusive.

27. A charge transport material according to claim 26 wherein  $\text{Z}$  is a bond.

28. A charge transport material according to claim 26 wherein  $\text{X}_1$  and  $\text{X}_2$  are, each independently, a methylene group.

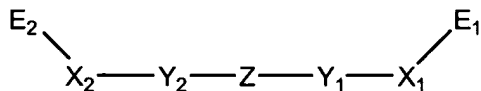
29. A charge transport material according to claim 26 wherein  $\text{E}_1$  and  $\text{E}_2$  are, each independently, an oxiranyl ring.

30. A charge transport material according to claim 26 wherein the charge transport material is selected from the group consisting of the following formula:



where  $\text{R}_8$  and  $\text{R}_9$  are, each independently, H, hydroxyl, thiol, carboxyl, -CHO, a keto group, an amino group, cyano, nitro, a halogen, an alkoxyl group, an alkyl group, an alkenyl group, an epoxy group, a thiiranyl group, an aziridino group, a heterocyclic group, or an aromatic group.

31. A polymeric charge transport material prepared by the reaction of a functional group in a polymeric binder with at least an epoxy group in a compound having the formula



where  $\text{Y}_1$  and  $\text{Y}_2$  comprise, each independently, a carbazolyl group;

$\text{X}_1$  and  $\text{X}_2$ , each independently, have the formula  $-(\text{CH}_2)_m-$ , branched or linear, where  $m$  is an integer between 0 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, P, C=O, O=S=O, a heterocyclic group, an aromatic group, urethane, urea, an ester group, an amide group, an  $\text{NR}_3$  group, a  $\text{CR}_4$ , or a  $\text{CR}_5\text{R}_6$  group where  $\text{R}_3$ ,  $\text{R}_4$ ,  $\text{R}_5$ , and  $\text{R}_6$  are, independently, a bond, H, hydroxyl, thiol, carboxyl, an amino group, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring;

$\text{E}_1$  and  $\text{E}_2$  comprise, each independently, an epoxy group; and

Z is a linking group comprising a bond, a  $-(\text{CR}_5=\text{CR}_6-)_n-$  group, a  $-\text{CR}_7=\text{N}-$  group, or an aromatic group, where  $\text{R}_5$ ,  $\text{R}_6$ , and  $\text{R}_7$  are, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, or an aromatic group, and  $n$  is an integer between 1 and 10, inclusive.

32. A polymeric charge transport material according to claim 31 wherein the functional group of the binder is selected from the group consisting of hydroxyl group, carboxyl group, an amino group, and thiol group.

33. A polymeric charge transport material according to claim 31 wherein a crosslinking agent is bonded between the epoxy group and the functional group of the binder.

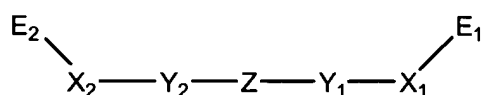
34. A polymeric charge transport material according to claim 31 wherein Z is a bond.



35. A polymeric charge transport material according to claim 31 wherein E<sub>1</sub> and E<sub>2</sub> are, each independently, an oxiranyl ring.

36. An organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising:

(a) a polymeric charge transport compound prepared by the reaction of a functional group in a polymeric binder with at least an epoxy group in a compound having the formula



where Y<sub>1</sub> and Y<sub>2</sub> comprise, each independently, a carbazolyl group;

X<sub>1</sub> and X<sub>2</sub>, each independently, have the formula -(CH<sub>2</sub>)<sub>m</sub>-, branched or linear, where m is an integer between 0 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, P, C=O, O=S=O, a heterocyclic group, an aromatic group, urethane, urea, an ester group, an amide group, an NR<sub>3</sub> group, a CR<sub>4</sub>, or a CR<sub>5</sub>R<sub>6</sub> group where R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, and R<sub>6</sub> are, independently, a bond, H, hydroxyl, thiol, carboxyl, an amino group, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring;

E<sub>1</sub> and E<sub>2</sub> comprise, each independently, an epoxy group; and

Z is a linking group comprising a bond, a -(CR<sub>5</sub>=CR<sub>6</sub>)<sub>n</sub>- group, a -CR<sub>7</sub>=N- group, or an aromatic group, where R<sub>5</sub>, R<sub>6</sub>, and R<sub>7</sub> are, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, or an aromatic group, and n is an integer between 1 and 10, inclusive; and

(b) a charge generating compound.

37. An organophotoreceptor according to claim 36 wherein the photoconductive element further comprises a charge transport material.

38. An organophotoreceptor according to claim 37 wherein the charge transport material comprises an electron transport compound.

1           39.    An organophotoreceptor according to claim 36 wherein the functional  
2   group of the binder is selected from the group consisting of hydroxyl group, carboxyl  
3   group, an amino group, and thiol group.

1           40.    An organophotoreceptor according to claim 36 wherein Z is a bond.

1           41.    An organophotoreceptor according to claim 36 wherein E<sub>1</sub> and E<sub>2</sub> are,  
2   each independently, an oxiranyl group.